

Chapter 51-11C WAC

STATE BUILDING CODE ADOPTION AND AMENDMENT OF THE 2012 EDITION OF THE INTERNATIONAL ENERGY CONSERVATION CODE, COMMERCIAL

NEW SECTION

WAC 51-11C-10000 Chapter 1 [CE]--Scope and administration.

NEW SECTION

WAC 51-11C-10100 Section C101--Scope and general requirements.

C101.1 Title. This code shall be known as the *International Energy Conservation Code* of [NAME OF JURISDICTION], and shall be cited as such. It is referred to herein as "this code."

C101.2 Scope. This code applies to *commercial buildings* and the buildings sites and associated systems and equipment.

EXCEPTION: The provisions of this code do not apply to temporary growing structures used solely for the commercial production of horticultural plants including ornamental plants, flowers, vegetables, and fruits. "Temporary growing structure" means a structure that has the sides and roof covered with polyethylene, polyvinyl, or similar flexible synthetic material and is used to provide plants with either frost protection or increased heat retention. A temporary growing structure is not considered a building for purposes of this code.

C101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

NEW SECTION

WAC 51-11C-10140 Section C101.4--Applicability.

C101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

C101.4.1 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C101.4.2 Historic buildings. The building official may modify the specific requirements of this code for historic buildings and require in lieu of alternate requirements which will result in a reasonable degree of energy efficiency. This modification may be allowed for those buildings or structures that are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state registers of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the national register of historic places.

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

EXCEPTION:

The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are insulated to full depth with insulation having a minimum nominal value of R-3.0 per inch installed per Section C402.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

C101.4.3.1 Lighting and motors. Alterations that replace 60 percent or more of the luminaires in a space enclosed by walls or ceiling-height partitions shall comply with Sections C405.5 and C405.6. Where less than 60 percent of the fixtures in a space enclosed by walls or ceiling-height partitions are new, the installed lighting wattage shall be maintained or reduced.

Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, controls shall comply with Sections C405.2.1, C405.2.2.3, C405.2.3, C405.3.4, and as applicable C408.3. In addition, office areas less than 300 ft² enclosed by walls or ceiling-height partitions, and all meeting and conference rooms, and all school classrooms, shall be equipped with occupancy sensors that comply with Section C405.2.2 and C408.3. Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall also comply with the other requirements in Sections C405.2.2 and C408.3.

Where new walls or ceiling-height partitions are added to an existing space and create a new enclosed space, but the lighting fixtures are not being changed, other than being relocated, the new enclosed space shall have controls that comply with Sections C405.2.1, C 405.2.2, C405.2.3 and C408.3.

Those motors which are altered or replaced shall comply with Section C403.2.13.

C101.4.3.2 Mechanical systems. Those parts of systems which are altered or replaced shall comply with Section C403. Additions or alterations shall not be made to an existing mechanical system that will cause the existing mechanical system to become out of compliance.

All new systems in existing buildings, including packaged unitary equipment and packaged split systems, shall comply with Section C403.

Where mechanical cooling is added to a space that was not previously cooled, the mechanical cooling system shall comply with the economizer requirements in Section C403.3.1 or C403.4.1.

EXCEPTION: Alternate designs that are not in full compliance with this code may be approved when the building official determines that existing building or occupancy constraints make full compliance impractical or where full compliance would be economically impractical.

Alterations to existing mechanical cooling systems shall not decrease economizer capacity unless the system complies with Section C403.3.1 or C403.4.1. In addition, for existing mechanical cooling systems that do not comply with Sections C403.3.1 or Section 403.4.1, including both the individual unit size limits and the total building capacity limits on units without economizer, other alterations shall comply with Table C101.4.3.1.

When space cooling equipment is replaced, controls shall be installed to provide for integrated operation with economizer in accordance with Section C403.3.

Existing equipment currently in use may be relocated within the same floor or same tenant space if removed and reinstalled within the same permit.

C101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Any space that is converted to a residential dwelling unit or portion thereof, from another use or occupancy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

C101.4.5 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

C101.4.6 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC--Commercial Provisions or IECC--Residential Provisions.

NEW SECTION

WAC 51-11C-10143 Table C101.4.3.1--Economizer compliance options for mechanical alterations.

**Table C101.4.3.1
Economizer Compliance Options for Mechanical Alterations**

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit of the same type with the same or smaller output capacity	Replacement unit of the same type with a larger output capacity	New equipment added to existing system or replacement unit of a different type
1. Packaged Units	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,3}	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,3}	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}
2. Split Systems	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: + 10/5% ⁵ Economizer: Shall not decrease existing economizer capability	Only for new units < 54,000 Btuh replacing unit installed prior to 1991 (one of two): Efficiency: + 10/5% ⁵ Economizer: 50% ⁶ For units > 54,000 Btuh or any units installed after 1991: Option A	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit of the same type with the same or smaller output capacity	Replacement unit of the same type with a larger output capacity	New equipment added to existing system or replacement unit of a different type
3. Water Source Heat Pump	Efficiency: min. ¹ Economizer: C403.4.1 ²	(two of three): Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶	(three of three): Efficiency: + 10/5% ⁵ Flow control valve ⁷ Economizer: 50% ⁶ (except for certain pre-1991 systems ⁸)	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4} (except for certain pre-1991 systems ⁸)
4. Hydronic Economizer using Air-Cooled Heat Rejection Equipment (Dry Cooler)	Efficiency: min. ¹ Economizer: 1433 ²	Efficiency: + 10/5% ⁵ Economizer: Shall not decrease existing economizer capacity	Option A	Efficiency: min. ¹ Economizer: 1433 ^{2,4}
5. Air-Handling Unit (including fan coil units) where the system has an air-cooled chiller	Efficiency: min. ¹ Economizer: C403.4.1 ²	Economizer: Shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸)	Option A (except for certain pre-1991 systems ⁸)
6. Air-Handling Unit (including fan coil units) and Water-cooled Process Equipment, where the system has a water-cooled chiller ¹⁰	Efficiency: min. ¹ Economizer: C403.4.1 ²	Economizer: Shall not decrease existing economizer capacity	Option A (except for certain pre-1991 systems ⁸ and certain 1991-2004 systems ⁹)	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4} (except for certain pre-1991 systems ⁸ and certain 1991-2004 systems ⁹)
7. Cooling Tower	Efficiency: min. ¹ Economizer: C403.4.1 ²	No requirements	Option A	Option A
8. Air-Cooled Chiller	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: + 5% ¹¹ Economizer: Shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 10% ¹² and (2) multistage Economizer: Shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	Any alteration with new or replacement equipment	Replacement unit of the same type with the same or smaller output capacity	Replacement unit of the same type with a larger output capacity	New equipment added to existing system or replacement unit of a different type
9. Water-Cooled Chiller	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency (one of two): (1) + 10% ¹³ or (2) plate-frame heat exchanger ¹⁵ Economizer: Shall not decrease existing economizer capacity	Efficiency (two of two): (1) + 15% ¹⁴ and (2) plate-frame heat exchanger ¹⁵ Economizer: Shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}
10. Boiler	Efficiency: min. ¹ Economizer: C403.4.1 ²	Efficiency: + 8% ¹⁶ Economizer: Shall not decrease existing economizer capacity	Efficiency: + 8% ¹⁶ Economizer: Shall not decrease existing economizer capacity	Efficiency: min. ¹ Economizer: C403.4.1 ^{2,4}

- ¹ Minimum equipment efficiency shall comply with Section C403.2.3 and Tables C403.2.3(1) through C403.2.3(9).
- ² System and building shall comply with Section C403.4.1 (including both the individual unit size limits and the total building capacity limits on units without economizer). It is acceptable to comply using one of the exceptions to Section C403.4.1.
- ³ All equipment replaced in an existing building shall have air economizer complying with Sections C403.3.1 and C403.4.1 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section C403.3.1.
- ⁴ All separate new equipment added to an existing building shall have air economizer complying with Sections C403.3.1 and C403.4.1 unless both the individual unit size and the total capacity of units without air economizer in the building is less than that allowed in Exception 1 to Section C403.4.1.
- ⁵ Equipment shall have a capacity-weighted average cooling system efficiency:
 - a. For units with a cooling capacity below 54,000 Btuh, a minimum of 10% greater than the requirements in Tables C403.2.3(1) and C403.2.3(2) (1.10 x values in Tables C403.2.3(1) and C403.2.3(2)).
 - b. For units with a cooling capacity of 54,000 Btuh and greater, a minimum of 5% greater than the requirements in Tables C403.2.3(1) and C403.2.3(2) (1.05 x values in Tables C403.2.3(1) and C403.2.3(2)).
- ⁶ Minimum of 50% air economizer that is ducted in a fully enclosed path directly to every heat pump unit in each zone, except that ducts may terminate within 12 inches of the intake to an HVAC unit provided that they are physically fastened so that the outside air duct is directed into the unit intake. If this is an increase in the amount of outside air supplied to this unit, the outside air supply system shall be capable of providing this additional outside air and equipped with economizer control.
- ⁷ Have flow control valve to eliminate flow through the heat pumps that are not in operation with variable speed pumping control complying with Section C403.4.3 for that heat pump.
 - When the total capacity of all units with flow control valves exceeds 15% of the total system capacity, a variable frequency drive shall be installed on the main loop pump.
 - As an alternate to this requirement, have a capacity-weighted average cooling system efficiency that is 5% greater than the requirements in note 5 (i.e., a minimum of 15%/10% greater than the requirements in Tables C403.2.3(1) and C403.2.3(2) (1.15/1.10 x values in Tables C403.2.3(1) and C403.2.3(2)).
- ⁸ Systems installed prior to 1991 without fully utilized capacity are allowed to comply with Option B, provided that the individual unit cooling capacity does not exceed 90,000 Btuh.
- ⁹ Economizer not required for systems installed with water economizer plate and frame heat exchanger complying with previous codes between 1991 and June 2013, provided that the total fan coil load does not exceed the existing or added capacity of the heat exchangers.
- ¹⁰ For water-cooled process equipment where the manufacturers' specifications require colder temperatures than available with waterside economizer, that portion of the load is exempt from the economizer requirements.
- ¹¹ The air-cooled chiller shall have an IPLV efficiency that is a minimum of 5% greater than the IPLV requirements in Table C403.2.3(7) (1.05 x IPLV values in Table C403.2.3(7)).
- ¹² The air-cooled chiller shall:
 - a. Have an IPLV efficiency that is a minimum of 10% greater than the IPLV requirements in Table C403.2.3(7) (1.10 x IPLV values in Table C403.2.3(7)); and
 - b. Be multistage with a minimum of two compressors.
- ¹³ The water-cooled chiller shall have an IPLV efficiency that is a minimum of 10% greater than the IPLV requirements in Table C403.2.3(7) (1.10 x IPLV values in Table C403.2.3(7)).
- ¹⁴ The water-cooled chiller shall have an IPLV efficiency that is a minimum of 15% greater than the IPLV requirements in Table C403.2.3(7), (1.15 x IPLV values in Table C403.2.3(7)).
- ¹⁵ Economizer cooling shall be provided by adding a plate-frame heat exchanger on the waterside with a capacity that is a minimum of 20% of the chiller capacity at standard AHRI rating conditions.
- ¹⁶ The replacement boiler shall have an efficiency that is a minimum of 8% higher than the value in Table C403.2.3(5) (1.08 x value in Table C403.2.3(5)), except for electric boilers.

NEW SECTION

WAC 51-11C-10150 Section C101.5--Compliance.

C101.5 Compliance. *Residential buildings* shall meet the provisions of IECC--Residential Provisions. *Commercial buildings* shall meet the provisions of IECC--Commercial Provisions.

C101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

C101.5.2 Low energy-buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the wall insulation provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h • ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.

2. Those that do not contain *conditioned space*.

3. Greenhouses isolated from any conditioned space and not intended for occupancy.

NEW SECTION

WAC 51-11C-10200 Section C102--Alternate materials--Method of construction, design or insulating systems.

C102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.

NEW SECTION

WAC 51-11C-10300 Section C103--Construction documents.

C103.1 General. Construction documents and other supporting data shall be submitted in one or more sets with each application for a

permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

EXCEPTION: The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

C103.3.1 Approval of construction documents. When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped "Reviewed for Code Compliance." Such *approved* construction documents shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.

One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.

C103.3.2 Previous approvals. This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

C103.3.3 Phased approval. The *code official* shall have the authority to issue a permit for the construction of part of an

energy conservation system before the construction documents for the entire system have been submitted or *approved*, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.

C103.4 Amended construction documents. Changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

C103.5 Retention of construction documents. One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

NEW SECTION

WAC 51-11C-10400 Section C104--Inspections.

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official*.

C104.2 Required approvals. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*. Where applicable, inspections shall include at least:

C104.2.1 Envelope

C104.2.1.1 Wall Insulation Inspection: To be made after all wall insulation and air vapor retarder sheet or film materials are in place, but before any wall covering is placed.

C104.2.1.2 Glazing Inspection: To be made after glazing materials are installed in the building.

C104.2.1.3 Exterior Roofing Insulation: To be made after the installation of the roof insulation, but before concealment.

C104.2.1.4 Slab/Floor Insulation: To be made after the installation of the slab/floor insulation, but before concealment.

C104.2.2 Mechanical

C104.2.2.1 Mechanical Equipment Efficiency and Economizer: To be made after all equipment and controls required by this code are installed and prior to the concealment of such equipment or controls.

C104.2.2.2 Mechanical Pipe and Duct Insulation: To be made after all pipe and duct insulation is in place, but before concealment.

C104.2.3 Lighting and motors

C104.2.3.1 Lighting Equipment and Controls: To be made after the installation of all lighting equipment and controls required by this code, but before concealment of the lighting equipment.

C104.2.3.2 Motor Inspections: To be made after installation of all equipment covered by this code, but before concealment.

C104.3 Final inspection. The building shall have a final inspection and not be occupied until *approved*.

C104.4 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

C104.5 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

C104.6 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

C104.7 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

C104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.

C104.8.1 Revocation. The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

NEW SECTION

WAC 51-11C-10500 Section C105--Validity.

C105.1 General. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

NEW SECTION

WAC 51-11C-10600 Section C106--Referenced standards.

C106.1 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter 5, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections C106.1.1 and C106.1.2.

C106.1.1 Conflicts. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

C106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

C106.2 Conflicting requirements. Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.

C106.3 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

C106.4 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law. In addition to the requirements of this code, all occupancies shall conform to the provisions included in the State Building Code (chapter 19.27 RCW). In case of conflicts among the codes enumerated in RCW 19.27.031 (1) through (4) and this code, an earlier named code shall govern over those following. In the case of conflict between the duct sealing and insulation requirements of this code and the duct insulation requirements of Sections 603 and 604 of the *International Mechanical Code*, the duct insulation requirements of this code, or where applicable, a local jurisdiction's energy code shall govern.

NEW SECTION

WAC 51-11C-10700 Section C107--Fees.

C107.1 Fees. A permit shall not be issued until the fees prescribed in Section C107.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

C107.2 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

C107.3 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official*, which shall be in addition to the required permit fees.

C107.4 Related fees. The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

C107.5 Refunds. The *code official* is authorized to establish a refund policy.

NEW SECTION

WAC 51-11C-10800 Section C108--Stop work order.

C108.1 Authority. Whenever the *code official* finds any work regulated by this code being performed in a manner either contrary to the provisions of this code or dangerous or unsafe, the *code official* is authorized to issue a stop work order.

C108.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

C108.3 Emergencies. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.

C108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

NEW SECTION

WAC 51-11C-10900 Section C109--Board of appeals.

C109.1 General. In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *code official* shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *code official*.

C109.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

C109.3 Qualifications. The board of appeals shall consist of members who are qualified by experience and training and are not employees of the jurisdiction.

NEW SECTION

WAC 51-11C-11000 Section C110--Violations. It shall be unlawful for any person, firm, or corporation to erect or construct any building, or remodel or rehabilitate any existing building or structure in the state, or allow the same to be done, contrary to or in violation of any of the provisions of this code.

NEW SECTION

WAC 51-11C-11100 Section C111--Liability. Nothing contained in this code is intended to be nor shall be construed to create or form the basis for any liability on the part of any city or county or its officers, employees or agents for any injury or damage resulting from the failure of a building to conform to the

provisions of this code.

NEW SECTION

WAC 51-11C-20000 Chapter 2 [CE]--Definitions.

NEW SECTION

WAC 51-11C-20100 Section C201--General.

C201.1 Scope. Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter.

C201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

C201.3 Terms defined in other codes. Terms that are not defined in this code but are defined in the *International Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

C201.4 Terms not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

NEW SECTION

WAC 51-11C-20200 Section C202--General definitions.

NEW SECTION

WAC 51-11C-20201 Section C202.1--A.

ABOVE-GRADE WALL. A wall enclosing *conditioned space* that is not a below-grade wall. This includes between-floor spandrels,

peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

ACCESSIBLE. Admitting close approach as a result of not being guarded by locked doors, elevation or other effective means (see "Readily accessible").

ADDITION. An extension or increase in the *conditioned space* floor area or height of a building or structure.

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials.

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

APPROVED. Approval by the *code official* as a result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by nationally recognized organizations.

ATTIC AND OTHER ROOFS. All other roofs, including roofs with insulation entirely below (inside of) the roof structure (i.e., attics, cathedral ceilings, and single-rafter ceilings), roofs with insulation both above and below the roof structure, and roofs without insulation but excluding roofs with insulation entirely above deck and metal building roofs.

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").

NEW SECTION

WAC 51-11C-20202 Section C202.2--B.

BELOW-GRADE WALL. That portion of a wall in the building envelope that is entirely below the finish grade and in contact with the ground.

BUILDING. Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water heating systems and electric power and lighting systems located on the building site and supporting the building.

BUILDING COMMISSIONING. A process that verifies and documents that the selected building systems have been designed, installed, and function according to the owner's project requirements and construction documents, and to minimum code requirements.

BUILDING ENTRANCE. Any door, set of doors, doorway, or other form of portal that is used to gain access to the building from the outside by the public.

BUILDING SITE. A contiguous area of land that is under the ownership

or control of one entity.

BUILDING THERMAL ENVELOPE. The below-grade walls, above-grade walls, floor, roof, and any other building elements that enclose *conditioned space* or provides a boundary between *conditioned space* and exempt or unconditioned space.

NEW SECTION

WAC 51-11C-20203 Section C202.3--C.

C-FACTOR (THERMAL CONDUCTANCE). The coefficient of heat transmission (surface to surface) through a building component or assembly, equal to the time rate of heat flow per unit area and the unit temperature difference between the warm side and cold side surfaces (Btu/h ft² x °F) [W/(m² x K)].

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

COEFFICIENT OF PERFORMANCE (COP) - COOLING. The ratio of the rate of heat removal to the rate of energy input, in consistent units, for a complete refrigerating system or some specific portion of that system under designated operating conditions.

COEFFICIENT OF PERFORMANCE (COP) - HEATING. The ratio of the rate of heat removal to the rate of heat delivered to the rate of energy input, in consistent units, for a complete heat pump system, including the compressor and, if applicable, auxiliary heat, under designated operating conditions.

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of "Residential buildings."

CONDITIONED FLOOR AREA. The horizontal projection of the floors associated with the *conditioned space*.

CONDITIONED SPACE. An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*.

CONTINUOUS AIR BARRIER. A combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.

CONTINUOUS INSULATION (CI). Insulation that is continuous across all structural members without thermal bridges other than fasteners (i.e., screws and nails) and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope. For the purposes of this definition of continuous insulation, only screws and nails are considered fasteners. Insulation installed between metal studs, z-girts, z-channels, shelf angles, or insulation with penetrations by brick ties and offset brackets, or any other similar framing is not considered continuous insulation, regardless of whether the metal is continuous or occasionally discontinuous or has thermal break material.

CURTAIN WALL. Fenestration products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.

NEW SECTION

WAC 51-11C-20204 Section C202.4--D.

DATA ACQUISITION SYSTEM. An electronic system managed by the building owner to collect, tabulate and display metering information.

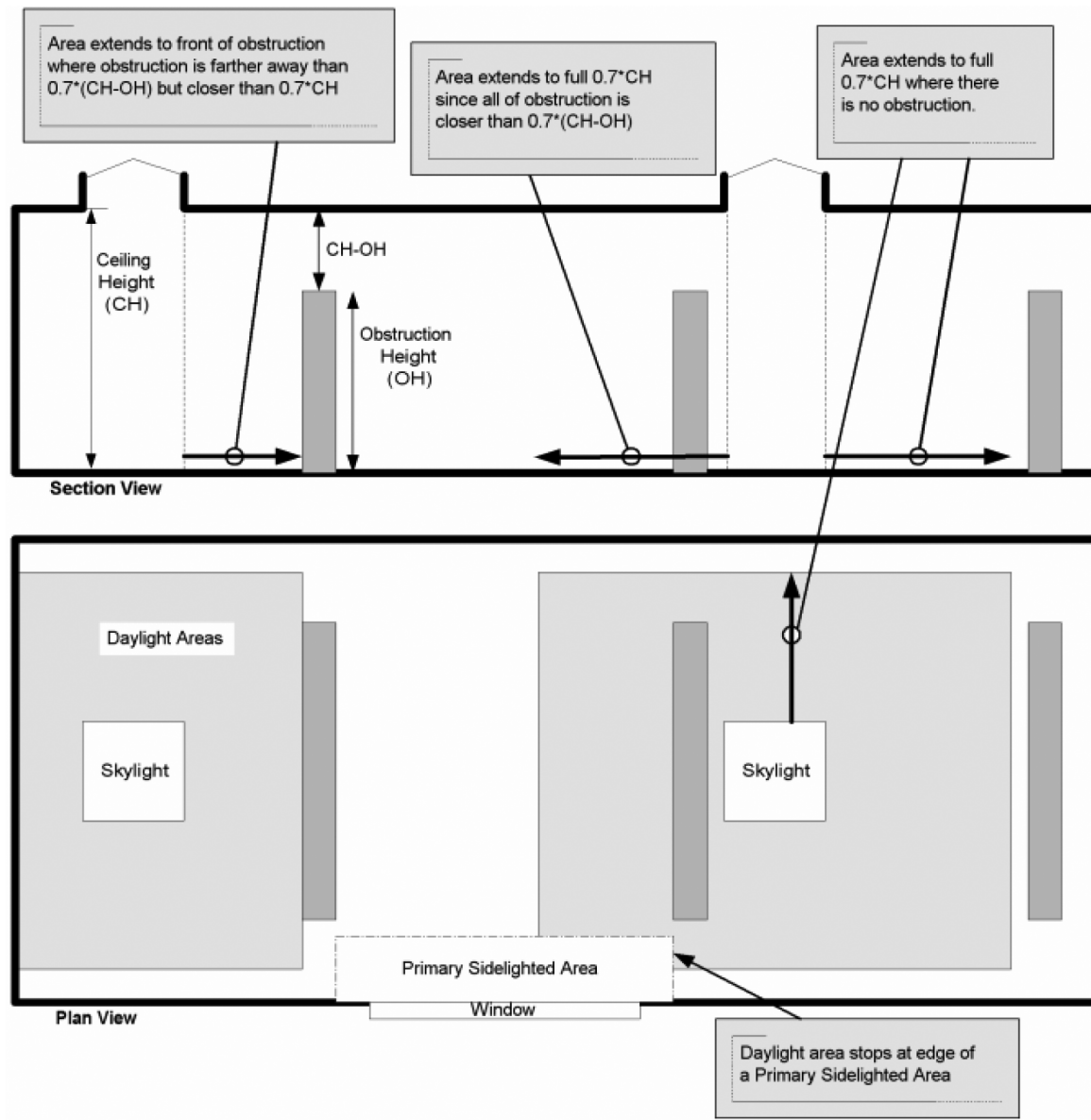
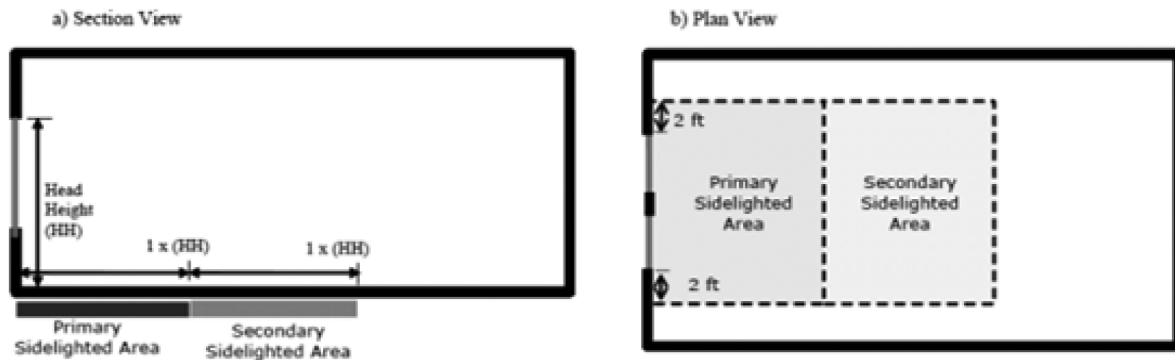
DAYLIGHT ZONE. (See also Fig. C202.4)

1. **Under skylights.** The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension in that direction plus either 70 percent of the floor-to-ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.

2. **Adjacent to vertical fenestration.** The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the primary daylight zone depth is assumed to extend into the space a distance equal to the window head height and the secondary daylighted zone extends from the edge of the primary zone to a distance equal to two times the window head height or to the nearest ceiling height opaque partition, whichever is less. The daylight zone width is assumed to be the width of the window plus 2 feet (610 mm) on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration, whichever is least.

3. **In parking garages.** The area within 20 feet of any portion of a perimeter wall that has a net opening to wall ratio of at least 40 percent and no exterior obstructions within 20 feet.

Figure C202.1



DEMAND CONTROL VENTILATION (DCV). A ventilation system capability that provides for the automatic reduction of outdoor air intake below

design rates when the actual occupancy of spaces served by the system is less than design occupancy.

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where pump(s) prime the service hot water piping with heated water upon demand for hot water.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

DUCT SYSTEM. A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

DYNAMIC GLAZING. Any fenestration product that has the fully reversible ability to change its performance properties, including U-factor, SHGC, or VT.

NEW SECTION

WAC 51-11C-20205 Section C202.5--E.

ECONOMIZER, AIR. A duct and damper arrangement and automatic control system that allows a cooling system to supply outside air to reduce or eliminate the need for mechanical cooling during mild or cold weather.

ECONOMIZER, WATER. A system where the supply air of a cooling system is cooled indirectly with water that is itself cooled by heat or mass transfer to the environment without the use of mechanical cooling.

ENCLOSED SPACE. A volume surrounded by solid surfaces such as walls, floors, roofs, and openable devices such as doors and operable windows.

END USE CATEGORY. A load or group of loads that consume energy in a common or similar manner.

ENERGY ANALYSIS. A method for estimating the annual energy use of the *proposed design* and *standard reference design* based on estimates of energy use.

ENERGY COST. The total estimated annual cost for purchased energy for the building functions regulated by this code, including applicable demand charges.

ENERGY RECOVERY VENTILATION SYSTEM. Systems that employ air-to-air heat exchangers to recover energy from exhaust air for the purpose of preheating, precooling, humidifying or dehumidifying outdoor ventilation air prior to supplying the air to a space, either directly or as part of an HVAC system.

ENERGY SIMULATION TOOL. An *approved* software program or calculation-based methodology that projects the annual energy use of a building.

ENERGY SOURCE METER. A meter placed at the source of the incoming energy that measures the energy delivered to the whole building or metered space.

ENTRANCE DOOR. Fenestration products used for ingress, egress and access in nonresidential buildings including, but not limited to, exterior entrances that utilize latching hardware and automatic closers and contain over 50 percent glass specifically designed to withstand heavy use and possibly abuse.

EQUIPMENT ROOM. A space that contains either electrical equipment, mechanical equipment, machinery, water pumps or hydraulic pumps that are a function of the building's services.

EXTERIOR WALL. Walls including both above-grade walls and below-grade walls.

NEW SECTION

WAC 51-11C-20206 Section C202.6--F.

FAN BRAKE HORSEPOWER (BHP). The horsepower delivered to the fan's shaft. Brake horsepower does not include the mechanical drive losses (belts, gears, etc.).

FAN SYSTEM BHP. The sum of the fan brake horsepower of all fans that are required to operate at fan system design conditions to supply air from the heating or cooling source to the *conditioned space(s)* and return it to the source or exhaust it to the outdoors.

FAN SYSTEM DESIGN CONDITIONS. Operating conditions that can be expected to occur during normal system operation that result in the highest supply fan airflow rate to conditioned spaces served by the system.

FAN SYSTEM MOTOR NAMEPLATE HP. The sum of the motor nameplate horsepower of all fans that are required to operate at design conditions to supply air from the heating or cooling source to the *conditioned space(s)* and return it to the source or exhaust it to the outdoors.

FENESTRATION. Skylights, roof windows, vertical windows (fixed or moveable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors. Fenestration includes products with glass and nonglass glazing materials.

FENESTRATION AREA. Total area of the fenestration measured using the rough opening, and including the glazing, sash and frame.

FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field fabricated does not include site-built fenestration.

FENESTRATION PRODUCT, SITE-BUILT. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems.

F-FACTOR. The perimeter heat loss factor for slab-on-grade floors (Btu/h x ft x °F) [W/(m x K)].

FURNACE ELECTRICITY RATIO. The ratio of furnace electricity use to total furnace energy computed as ratio = $(3.412 \times EAE)/1000 \times EF + 3.412 \times EAE$ where *EAE* (average annual auxiliary electrical consumption) and *EF* (average annual fuel energy consumption) are defined in Appendix N to Subpart B of Part 430 of Title 10 of the Code of Federal Regulations and *EF* is expressed in millions of Btus per year.

NEW SECTION

WAC 51-11C-20207 Section C202.7--G.

GENERAL LIGHTING. Lighting that provides a substantially uniform level of illumination throughout an area. General lighting shall not include decorative lighting or lighting that provides a dissimilar level of illumination to serve a specialized application or feature within such area.

NEW SECTION

WAC 51-11C-20208 Section C202.8--H.

HEAT TRAP. An arrangement of piping and fittings, such as elbows, or a commercially available heat trap that prevents thermosyphoning of hot water during standby periods.

HEATED SLAB-ON-GRADE FLOOR. Slab-on-grade floor construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

HIGH-EFFICACY LUMINAIRES. Luminaires with compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps, or lamps with a minimum efficacy of:

1. 60 Lumens per watt for lamps over 40 watts;
2. 50 Lumens per watt for lamps over 15 watts to 40 watts; and
3. 40 Lumens per watt for lamps 15 watts or less.

HUMIDISTAT. A regulatory device, actuated by changes in humidity, used for automatic control of relative humidity.

NEW SECTION

WAC 51-11C-20209 Section C202.9--I.

INFILTRATION. The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INSULATING SHEATHING. An insulating board with a core material having a minimum *R*-value of *R*-2.

INSULATION ENTIRELY ABOVE DECK. A roof with all insulation:

1. Installed above (outside of) the roof structure; and
2. Continuous (i.e., uninterrupted by framing members).

INTEGRATED ENERGY EFFICIENCY RATIO (IEER). A single-number figure of merit expressing cooling part-load EER efficiency for unitary air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for the equipment.

INTEGRATED PART LOAD VALUE (IPLV). A single number figure of merit based on part-load EER, COP, or kW/ton expressing part-load efficiency for air conditioning and heat pump equipment on the basis of weighted operation at various load capacities for equipment.

NEW SECTION

WAC 51-11C-20210 Section C202.10--J.

NEW SECTION

WAC 51-11C-20211 Section C202.11--K.

NEW SECTION

WAC 51-11C-20212 Section C202.12--L.

LABELED. Equipment, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

LISTED. Equipment, materials, products or services included in a

list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of *listed* equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW-VOLTAGE LIGHTING. A lighting system consisting of an isolating power supply, the low voltage luminaires, and associated equipment that are all identified for the use. The output circuits of the power supply are rated for not more than 25 amperes and operate at 30 volts (42.4 volts peak) or less under all load conditions.

LUMINAIRE. A complete lighting unit consisting of a lamp or lamps together with the housing designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply.

NEW SECTION

WAC 51-11C-20213 Section C202.13--M.

MANUAL. Capable of being operated by personal intervention (see "Automatic").

METAL BUILDING ROOF. A roof that:

1. Is constructed with a metal, structural, weathering surface;
2. Has no ventilated cavity; and
3. Has the insulation entirely below deck (i.e., does not include composite concrete and metal deck construction nor a roof framing system that is separated from the superstructure by a wood substrate) and whose structure consists of one or more of the following configurations:
 - a. Metal roofing in direct contact with the steel framing members;
 - b. Metal roofing separated from the steel framing members by insulation;
 - c. Insulated metal roofing panels installed as described in a or b.

METAL BUILDING WALL. A wall whose structure consists of metal spanning members supported by steel structural members (i.e., does not include spandrel glass or metal panels in curtain wall systems).

METER. A device that measures the flow of energy.

MICROCELL. A wireless communication facility consisting of an antenna that is either: (a) Four (4) feet in height and with an area of not more than 580 square inches; or (b) if a tubular antenna, no more than four (4) inches in diameter and no more than six (6) feet in length; and the associated equipment cabinet that is six (6) feet or less in height and no more than 48 square feet in floor area.

NEW SECTION

WAC 51-11C-20214 Section C202.14--N.

NAMEPLATE HORSEPOWER. The nominal motor horsepower rating stamped on the motor nameplate.

NONSTANDARD PART LOAD VALUE (NPLV). A single-number part-load efficiency figure of merit calculated and referenced to conditions other than IPLV conditions, for units that are not designed to operate at ARI standard rating conditions.

NEW SECTION

WAC 51-11C-20215 Section C202.15--O.

ON-SITE RENEWABLE ENERGY. Energy derived from solar radiation, wind, waves, tides, landfill gas, biomass, or the internal heat of the earth. The energy system providing on-site renewable energy shall be located on the project site.

NEW SECTION

WAC 51-11C-20216 Section C202.16--P.

PERSONAL WIRELESS SERVICE FACILITY. A wireless communication facility (WCF), including a microcell, which is a facility for the transmission and/or reception of radio frequency signals and which may include antennas, equipment shelter or cabinet, transmission cables, a support structure to achieve the necessary elevation, and reception and/or transmission devices or antennas.

PROPOSED DESIGN. A description of the proposed building used to estimate annual energy use for determining compliance based on total building performance.

NEW SECTION

WAC 51-11C-20217 Section C202.17--Q.

NEW SECTION

WAC 51-11C-20218 Section C202.18--R.

READILY ACCESSIBLE. Capable of being reached quickly for operation, renewal or inspection without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders or access equipment (see "Accessible").

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of 3,000 ft² or greater.

REFRIGERATED WAREHOUSE FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of 3,000 ft² or greater.

REPAIR. The reconstruction or renewal of any part of an existing building.

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane.

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof covering, underlayment, roof deck, insulation, vapor retarder and interior finish.

R-VALUE (THERMAL RESISTANCE). The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \bullet \text{ft}^2 \bullet ^\circ\text{F}/\text{Btu}$) [$(\text{m}^2 \bullet \text{K})/\text{W}$].

NEW SECTION

WAC 51-11C-20219 Section C202.19--S.

SCREW LAMP HOLDERS. A lamp base that requires a screw-in-type lamp, such as a compact-fluorescent, incandescent, or tungsten-halogen bulb.

SEMI-HEATED SPACE. An enclosed space within a building, including adjacent connected spaces separated by an uninsulated component

(e.g., basements, utility rooms, garages, corridors), which:

1. Has a maximum heating system output capacity which shall be 3 Btu/(h-ft²) but not greater than 8 Btu/(h-ft²) in Climate Zones 4 and 5, or shall be 5 Btu/(h-ft²) but not greater than 12 Btu/(h-ft²) in Climate Zone 6;

2. Is not a cold storage space or frozen storage space.

SERVICE WATER HEATING. Heating water for domestic or commercial purposes other than space heating and process requirements.

SKYLIGHT. Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal. Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.

SLAB BELOW GRADE. Any portion of a slab floor in contact with the ground which is more than 24 inches below the final elevation of the nearest exterior grade.

SLAB-ON-GRADE FLOOR. That portion of a slab floor of the building envelope that is in contact with the ground and that is either above grade or is less than or equal to 24 inches below the final elevation of the nearest exterior grade.

SLEEPING UNIT. A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not *sleeping units*.

SMALL BUSINESS. Any business entity (including a sole proprietorship, corporation, partnership or other legal entity) which is owned and operated independently from all other businesses, which has the purpose of making a profit, and which has fifty or fewer employees.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then reradiated, conducted or convected into the space.

STANDARD REFERENCE DESIGN. A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

STEEL-FRAMED WALL. A wall with a cavity (insulated or otherwise) whose exterior surfaces are separated by steel framing members (i.e., typical steel stud walls and curtain wall systems).

STOREFRONT. A nonresidential system of doors and windows mullied as a composite fenestration structure that has been designed to resist heavy use. *Storefront* systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on commercial buildings, with or without mullied windows and doors.

SUBSYSTEM METER. A meter placed downstream of the energy supply meter that measures the energy delivered to a load or a group of loads.

SUNROOM. A one-story structure attached to a dwelling with a glazing area in excess of 40 percent of the gross area of the structure's exterior walls and roof.

NEW SECTION

WAC 51-11C-20220 Section C202.20--T.

THERMAL ISOLATION. Physical and space conditioning separation from *conditioned space(s)*. The *conditioned space(s)* shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.

THERMOSTAT. An automatic control device used to maintain temperature at a fixed or adjustable set point.

NEW SECTION

WAC 51-11C-20221 Section C202.21--U.

U-FACTOR (THERMAL TRANSMITTANCE). The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h • ft² • °F) [W/(m² • K)].

UNHEATED SLAB-ON-GRADE FLOOR. A slab-on-grade floor that is not a heated slab-on-grade floor.

NEW SECTION

WAC 51-11C-20222 Section C202.22--V.

VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR. That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

VERTICAL FENESTRATION. All fenestration other than skylights.

VISIBLE TRANSMITTANCE [VT]. The ratio of visible light entering the space through the fenestration product assembly to the incident visible light, visible transmittance, includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

NEW SECTION

WAC 51-11C-20223 Section C202.23--W.

WALK-IN COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of less than 3,000 ft².

WALK-IN FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of less than 3,000 ft².

WALL. That portion of the *building envelope*, including *opaque* area and *fenestration*, that is vertical or tilted at an angle of 60 degrees from horizontal or greater. This includes *above-grade walls* and *below-grade walls*, between floor spandrels, peripheral edges of floors, and foundation walls.

WOOD-FRAMED AND OTHER WALLS. All other *wall* types, including wood stud walls.

NEW SECTION

WAC 51-11C-20224 Section C202.24--X, Y, Z.

ZONE. A space or group of spaces within a building with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.

NEW SECTION

WAC 51-11C-30000 Chapter 3 [CE]--General requirements.

NEW SECTION

WAC 51-11C-30100 Section C301--Climate zones.

C301.1 General. Climate zones from Table C301.1 shall be used in determining the applicable requirements from Chapter 4.

C301.2 Warm humid counties. Warm humid counties are identified in Table C301.1 by an asterisk.

C301.3 International climate zones. The climate zone for any location outside the United States shall be determined by applying

Table C301.3(1) and then Table C301.3(2).

Table C301.1
Climate Zones, Moisture Regimes, and Warm-Humid
Designations by State and County

Key: A - Moist, B - Dry, C - Marine. Absence of
moisture designation indicates moisture regime is
irrelevant. Asterisk (*) indicates a warm-humid location.

WASHINGTON

5B Adams	4C Grays Harbor	4C Pierce
5B Asotin	4C Island	4C San Juan
5B Benton	4C Jefferson	4C Skagit
5B Chelan	4C King	5B Skamania
4C Clallam	4C Kitsap	4C Snohomish
4C Clark	5B Kittitas	5B Spokane
5B Columbia	5B Klickitat	6B Stevens
4C Cowlitz	4C Lewis	4C Thurston
5B Douglas	5B Lincoln	4C Wahkiakum
6B Ferry	4C Mason	5B Walla Walla
5B Franklin	6B Okanogan	4C Whitcom
5B Garfield	4C Pacific	5B Whitman
5B Grant	6B Pend Oreille	5B Yakima

NEW SECTION

WAC 51-11C-30200 Section C302--Design conditions.

C302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

302.2 Exterior design conditions. The heating or cooling outdoor design temperatures shall be selected from Appendix C.

NEW SECTION

WAC 51-11C-30300 Section C303--Materials, systems and equipment.

NEW SECTION

WAC 51-11C-30310 Section 303.1--Identification.

C303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

C303.1.1.1 Blown or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 square feet (28 m²) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed *R*-value shall be *listed* on certification provided by the insulation installer.

C303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's *R*-value mark is readily observable upon inspection.

C303.1.3 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled *U*-factor shall be assigned a default *U*-factor from Table C303.1.3(1), C303.1.3(2) or C303.1.3(4). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3).

EXCEPTION: Units without NFRC ratings produced by a small business may be assigned default *U*-factors from Table C303.1.3(5) for vertical fenestration.

C303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the

U.S. Federal Trade Commission *R*-value rule (C.F.R. Title 16, Part 460) in units of $h \times ft^2 \times ^\circ F/Btu$ at a mean temperature of $75^\circ F$ ($24^\circ C$).

NEW SECTION

WAC 51-11C-303131 Table C303.1.3(1)--Default glazed fenestration *U*-factor.

**Table C303.1.3(1)
Default Glazed Fenestration *U*-Factor**

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKY-LIGHT
Metal	1.20	0.80	See Table C303.1.3(4)
Metal with Thermal Break	1.10	0.65	
Nonmetal or Metal Clad	0.95	0.55	
Glazed Block	0.60		

NEW SECTION

WAC 51-11C-303132 Table C303.1.3(2)--Default door *U*-factors.

**Table C303.1.3(2)
Default Door *U*-Factors
See Appendix A, Section A107**

NEW SECTION

WAC 51-11C-303133 Table C303.1.3(3)--Default glazed fenestration SHGC and VT.

Table C303.1.3(3)
Default Glazed Fenestration SHGC and VT

	SINGLE GLAZED		DOUBLE GLAZED		GLAZE BLOCK
	Clear	Tinted	Clear	Tinted	
SHGC	0.40	0.40	0.40	0.40	0.40
VT	0.6	0.3	0.6	0.3	0.6

NEW SECTION

WAC 51-11C-303134 Table C303.1.3(4)--Default *U*-factors for skylights.

Table R303.1.3(4)
Default *U*-Factors for Skylights

Fenestration Type	Frame Type			
	Aluminum Without Thermal Break	Aluminum With Thermal Break	Reinforced Vinyl/Aluminum-Clad Wood or Vinyl	Wood or Vinyl-Clad Wood/Vinyl Without Reinforcing
Single Glazing				
glass	U-1.58	U-1.51	U-1.40	U-1.18
acrylic/polycarb	U-1.52	U-1.45	U-1.34	U-1.11
Double Glazing				
air	U-1.05	U-0.89	U-0.84	U-0.67
argon	U-1.02	U-0.86	U-0.80	U-0.64
Double Glazing, $e = 0.20$				
air	U-0.96	U-0.80	U-0.75	U-0.59
argon	U-0.91	U-0.75	U-0.70	U-0.54
Double Glazing, $e = 0.10$				
air	U-0.94	U-0.79	U-0.74	U-0.58
argon	U-0.89	U-0.73	U-0.68	U-0.52
Double Glazing, $e = 0.05$				
air	U-0.93	U-0.78	U-0.73	U-0.56
argon	U-0.87	U-0.71	U-0.66	U-0.50
Triple Glazing				
air	U-0.90	U-0.70	U-0.67	U-0.51
argon	U-0.87	U-0.69	U-0.64	U-0.48
Triple Glazing, $e = 0.20$				
air	U-0.86	U-0.68	U-0.63	U-0.47
argon	U-0.82	U-0.63	U-0.59	U-0.43
Triple Glazing, $e = 0.20$ on 2 surfaces				

Fenestration Type	Frame Type			
	Aluminum Without Thermal Break	Aluminum With Thermal Break	Reinforced Vinyl/Aluminum-Clad Wood or Vinyl	Wood or Vinyl-Clad Wood/Vinyl Without Reinforcing
air	U-0.82	U-0.64	U-0.60	U-0.44
argon	U-0.79	U-0.60	U-0.56	U-0.40
Triple Glazing, $e = 0.10$ on 2 surfaces				
air	U-0.81	U-0.62	U-0.58	U-0.42
argon	U-0.77	U-0.58	U-0.54	U-0.38
Quadruple Glazing, $e = 0.10$ on 2 surfaces				
air	U-0.78	U-0.59	U-0.55	U-0.39
argon	U-0.74	U-0.56	U-0.52	U-0.36
krypton	U-0.70	U-0.52	U-0.48	U-0.32

¹ U-factors are applicable to both glass and plastic, flat and domed units, all spacers and gaps.

² Emissivities shall be less than or equal to the value specified.

³ Gap fill shall be assumed to be air unless there is a minimum of 90 percent argon or krypton.

⁴ Aluminum frame with thermal break is as defined in footnote 1 to Table R303.1.3(1).

NEW SECTION

WAC 51-11C-303135 Table C303.1.3(5)--Small business compliance default table.

**Table C303.1.3(5)
Small Business Compliance Table
Default U-Factors for Vertical Glazing**

Vertical Glazing Description				Frame Type		
				Any Frame	Aluminum Thermal Break ²	Wood/Vinyl/Fiberglass
Panes	Low-e ¹	Spacer	Fill			
Double ³	A	Any	Argon	0.48	0.41	0.32
	B	Any	Argon	0.46	0.39	0.30
	C	Any	Argon	0.44	0.37	0.28
	C	High Performance	Argon	0.42	0.35	Deemed to comply ⁵
Triple ⁴	A	Any	Air	0.50	0.44	0.26
	B	Any	Air	0.45	0.39	0.22
	C	Any	Air	0.41	0.34	0.20
	Any double low-e	Any	Air	0.35	0.32	0.18

- ¹ Low-eA (emissivity) shall be 0.24 to 0.16.
Low-eB (emissivity) shall be 0.15 to 0.08.
Low-eC (emissivity) shall be 0.07 or less.
- ² Aluminum Thermal Break = An aluminum thermal break framed window shall incorporate the following minimum design characteristics:
 - a) The thermal conductivity of the thermal break material shall be not more than 3.6 Btu-in/h/ft²/°F;
 - b) The thermal break material must produce a gap in the frame material of not less than 0.210 inches; and
 - c) All metal framing members of the products exposed to interior and exterior air shall incorporate a thermal break meeting the criteria in a) and b) above.
- ³ A minimum air space of 0.375 inches between panes of glass is required for double glazing.
- ⁴ A minimum air space of 0.25 inches between panes of glass is required for triple glazing.
- ⁵ Deemed to comply glazing shall not be used for performance compliance.

NEW SECTION

WAC 51-11C-30320 Section C303.2--Installation.

C303.2 Installation. All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and the *International Building Code*.

C303.2.1 Protection of exposed foundation insulation. Insulation applied to the exterior of basement walls, crawlspace walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (153 mm) below grade.

NEW SECTION

WAC 51-11C-30330 Section C303.3--Maintenance information.

C303.3 Maintenance information. Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily accessible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

NEW SECTION

WAC 51-11C-40000 Chapter 4 [CE]--Commercial energy efficiency.

NEW SECTION

WAC 51-11C-40100 Section C401--General.

C401.1 Scope. The requirements contained in this chapter are applicable to commercial buildings, or portions of commercial buildings.

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of Sections C402, C403, C404, C405, C408 and C409. In addition, commercial buildings shall comply with either Section C406.2, C406.3, C406.4, or C406.5.

2. The requirements of Section C407, C408, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy consumption shall be equal to or less than 90 percent of the standard reference design building.

C401.2.1 Application to existing buildings. Additions, alterations and repairs to existing buildings shall comply with Sections C402, C403, C404, C405, C408 and C409.

NEW SECTION

WAC 51-11C-40200 Section C402--Building envelope requirements.

NEW SECTION

WAC 51-11C-40210 Section C402.1--General (Prescriptive).

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 or Section C402.1.3 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1. Walk-in coolers and walk-in freezers shall comply with C402.5. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with C402.6.

EXCEPTION:

Unstaffed equipment shelters or cabinets used solely for personal wireless service facilities.

NEW SECTION

WAC 51-11C-40211 Section C402.1.1--Insulation and fenestration criteria.

C402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Tables C402.2 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2.

NEW SECTION

WAC 51-11C-40212 Section C402.1.2--*U*-Factor alternative.

C402.1.2 *U*-factor alternative. An assembly with a *U*-factor, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-value in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table C402.1.2. The *U*-factors for typical construction assemblies are included in Appendix A. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Appendix A, values shall be calculated in accordance with the ASHRAE *Handbook of Fundamentals* using the framing factors listed in Appendix A where applicable and shall include the thermal bridging effects of framing materials.

NEW SECTION

WAC 51-11C-402121 Table C402.1.2--Opaque thermal envelope assembly requirements.

Option 1 for Section 51-11C-402121:

**Table C402.1.2
Opaque Thermal Envelope Assembly Requirements^a**

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	U-0.034	U-0.031	U-0.032	U-0.031
Metal buildings	U-0.031	U-0.031	U-0.029	U-0.031
Attic and other	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade				
Mass	U-0.078	U-0.078	U-0.078	U-0.071
Metal building	U-0.052	U-0.052	U-0.052	U-0.044
Steel framed	U-0.055	U-0.055	U-0.049	U-0.044
Wood framed and other	U-0.054	U-0.054	U-0.051	U-0.044
Walls, Below Grade				
Below-grade wall ^b	Same as above grade	Same as above grade	Same as above grade	Same as above grade
Floors				
Mass	U-0.031	U-0.031	U-0.031	U-0.031
Joist/framing	U-0.029	U-0.029	U-0.029	U-0.029
Slab-on-Grade Floors				
Unheated slabs	F-0.528	F-0.510	F-0.434	F-0.424
Heated slabs ^c	F-0.55	F-0.55	F-0.55	F-0.55

^a Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from Appendix A is required unless otherwise allowed by Section C402.1.2.

^b Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.

^c Heated slab *F*-factors shall be determined specifically for heated slabs. Unheated slab factors shall not be used.

Option 2 for Section 51-11C-402121:

**Table C402.1.2
Opaque Thermal Envelope Assembly Requirements^a**

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	U-0.034	U-0.031	U-0.032	U-0.031
Metal buildings	U-0.031	U-0.031	U-0.029	U-0.031
Attic and other	U-0.021	U-0.021	U-0.021	U-0.021

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Walls, Above Grade				
Mass	U-0.104 ^d	U-0.078	U-0.078	U-0.071
Metal building	U-0.052	U-0.052	U-0.052	U-0.044
Steel framed	U-0.055	U-0.055	U-0.049	U-0.044
Wood framed and other	U-0.054	U-0.054	U-0.051	U-0.044
Walls, Below Grade				
Below-grade wall ^b	Same as above grade	Same as above grade	Same as above grade	Same as above grade
Floors				
Mass	U-0.031	U-0.031	U-0.031	U-0.031
Joist/framing	U-0.029	U-0.029	U-0.029	U-0.029
Slab-on-Grade Floors				
Unheated slabs	F-0.528	F-0.510	F-0.434	F-0.424
Heated slabs ^c	F-0.55	F-0.55	F-0.55	F-0.55

^a Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from Appendix A is required unless otherwise allowed by Section C402.1.2.

^b Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.

^c Heated slab *F*-factors shall be determined specifically for heated slabs. Unheated slab factors shall not be used.

^d Exception: Integral insulated concrete block walls complying with ASTM C90 with all cores filled and meeting both of the following:

- 1 At least 50 percent of cores must be filled with vermiculite or equivalent fill insulation; and
- 2 The structure encloses one of the following uses: Warehouse (storage and retail), gymnasium, auditorium, church chapel, arena, kennel, manufacturing plant, indoor swimming pool, pump station, water and waste water treatment facility, storage facility, storage area, motor vehicle service facility.

NEW SECTION

WAC 51-11C-40213 Section C402.1.3--Component performance option.

C402.1.3 Component performance building envelope option.

C402.1.3.1 General. Buildings or structures whose design heat loss rate (UA_p) and solar heat gain coefficient rate ($SHGC * A_p$) are less than or equal to the target heat loss rate (UA_t) and solar heat gain coefficient rate ($SHGC * A_t$) shall be considered in compliance with this section. The stated *U*-factor, *F*-factor or allowable area of any component assembly, listed in Table C402.1.2 and Table C402.3, such as roof/ceiling, opaque wall, opaque door, fenestration, floor over conditioned space, slab-on-grade floor, radiant floor or opaque floor may be increased and the *U*-factor or *F*-factor for other components decreased, provided that the total heat gain or loss for the entire building envelope does not exceed the total resulting from compliance to the *U*-factors, *F*-factors or allowable areas specified in this section. Compliance shall be calculated in total for the building envelope for nonresidential spaces and for residential spaces.

C402.1.3.2 Component *U*-factors. The *U*-factors for typical construction assemblies are included in Chapter 3 and Appendix A. These values shall be used for all calculations. Where proposed construction assemblies are not represented in Chapter 3 or Appendix A, values shall be calculated in accordance with the 2009 ASHRAE Fundamentals Handbook, using the framing factors listed in Appendix A.

For envelope assemblies containing metal framing, the *U*-factor shall be determined by one of the following methods:

1. Results of laboratory measurements according to acceptable methods of test.
2. 2009 ASHRAE Fundamentals Handbook where the metal framing is bonded on one or both sides to a metal skin or covering.
3. The zone method as provided in 2009 ASHRAE Fundamentals Handbook.
4. Effective framing/cavity *R*-values as provided in Appendix A.

When return air ceiling plenums are employed, the roof/ceiling assembly shall:

- a. For thermal transmittance purposes, not include the ceiling proper nor the plenum space as part of the assembly; and
 - b. For gross area purposes, be based upon the interior face of the upper plenum surface.
5. Tables in ASHRAE 90.1-2007 Normative Appendix A.

C402.1.3.3 UA calculations. The target UA_t and the proposed UA_p shall be calculated using Equations C402-1 and C402-2 and the corresponding areas and *U*-factors from Table C402.1.2 and Table C402.3. For the target UA_t calculation, the skylights shall be located in roof/ceiling area up to the maximum skylight area per Section C402.3.1 and the remainder of the fenestration allowed per Section C402.3.1 shall be located in the wall area.

C402.1.3.4 SHGC calculations. Solar Heat Gain Coefficient Rate Calculations: Solar heat gain coefficient shall comply with Table C402.3. The target $SHGCA_t$ and the proposed $SHGCA_p$ shall be calculated using Equations C402-3 and C402-4 and the corresponding areas and SHGCs from Table C402.3.

NEW SECTION

WAC 51-11C-402131 Equation C402-1--Target UA_t .

**Equation C402-1
Target UA_t**

$$UA_t = U_{radt}A_{radt} + U_{mrt}A_{mrt} + U_{ort}A_{ort} + U_{mwt}A_{mwt} + U_{mbwt}A_{mbwt} + U_{mfwt}A_{mfwt} + U_{wt}A_{wt} + U_{fint}A_{fint} + U_{fjt}A_{fjt} + F_{st}P_{st} + F_{rst}P_{rst} + U_{dst}A_{dst} + U_{drt}A_{drt} + U_{vgt}A_{vgt} + U_{vgmt}A_{vgmt} + U_{vgmot}A_{vgmot} + U_{vgdt}A_{vgdt} + U_{ogort}A_{ogort}$$

U_{at} = The target combined specific heat transfer of the gross roof/ceiling assembly, exterior wall and floor area.

Where:

U_{radt} = The thermal transmittance value for roofs with the insulation entirely above deck found in Table C402.1.2.

U_{mrt} = The thermal transmittance value for metal building roofs found in Table C402.1.2.

U_{ort} = The thermal transmittance value for attic and other roofs found in Table C402.1.2.

U_{mwt} = The thermal transmittance value for opaque mass walls found in Table C402.1.2.

U_{mbwt} = The thermal transmittance value for opaque metal building walls found in Table C402.1.2.

$U_{mfw t}$ = The thermal transmittance value for opaque steel-framed walls found in Table C402.1.2.

U_{wt} = The thermal transmittance value for opaque wood framed and other walls found in Table C402.1.2.

U_{fmt} = The thermal transmittance value for mass floors over unconditioned space found in Table C402.1.2.

U_{fjt} = The thermal transmittance value for joist floors over unconditioned space found in Table C402.1.2.

F_{st} = The F-factor for slab-on-grade floors found in Table C402.1.2.

F_{rst} = The F-factor for radiant slab floors found in Table C402.1.2.

U_{dst} = The thermal transmittance value for opaque swinging doors found in Table C402.2.

U_{drt} = The thermal transmittance value for opaque roll-up or sliding doors found in Table C402.2.

U_{vgt} = The thermal transmittance value for vertical fenestration with nonmetal framing found in Table C402.3 which corresponds to the proposed total fenestration area as a percent of gross exterior wall area.

U_{vgmt} = The thermal transmittance value for vertical fenestration with fixed metal framing found in Table C402.3 which corresponds to the proposed total fenestration area as a percent of gross exterior wall area.

U_{vgmot} = The thermal transmittance value for vertical fenestration with operable metal framing found in Table C402.3 which corresponds to the proposed total fenestration area as a percent of gross exterior wall area.

U_{vgdt} = The thermal transmittance value for entrance doors found in Table C402.3 which corresponds to the proposed total fenestration area as a percent of gross exterior wall area.

U_{ogort} = The thermal transmittance for skylights found in Table C402.3 which corresponds to the proposed total fenestration area as a percent of gross exterior wall area.

A_{fmt} = The proposed mass floor over unconditioned space area, A_{fm} .

A_{fjt} = The proposed joist floor over unconditioned space area, A_{fs} .

P_{st} = The proposed linear feet of slab-on-grade floor perimeter, P_s .

P_{rst} = The proposed linear feet of radiant slab floor perimeter, P_s .

A_{dst} = The proposed opaque swinging door area, A_{ds} .

A_{drt} = The proposed opaque roll-up or sliding door area, A_{dr} .

and

If the total amount of fenestration area as a percent of gross exterior wall area does not exceed the maximum allowed in Section C402.3.1:

A_{radt} = The proposed roof area with insulation entirely above the deck, A_{rad} .

A_{mrt} = The proposed roof area for metal buildings, A_{mr} .

A_{ort} = The proposed attic and other roof area, A_{or} .

A_{mwt} = The proposed opaque above grade wall area, A_w .

A_{mbwt} = The proposed opaque above grade wall area, A_w .

A_{wt} = The proposed opaque above grade wall area, A_w .

- A_{vgt} = The proposed vertical fenestration area with nonmetal framing, A_{vg} .
 A_{vgmt} = The proposed vertical fenestration area with fixed metal framing, A_{vgm} .
 A_{vgmot} = The proposed vertical fenestration area with operable metal framing, A_{vgm} .
 A_{vgdt} = The proposed entrance door area, A_{vgd} .
 A_{ogort} = The proposed skylight area, A_{ogor} .
 or

If the total fenestration area as a percent of gross exterior wall area exceeds the maximum allowed in Section C402.3.1, the area of each fenestration element shall be reduced in the base envelope design by the same percentage and the net area of each wall type adjusted proportionately by the same percentage so that the total skylight and vertical fenestration area is exactly equal to the allowed percentage per Section C402.3.1 of the gross wall area.

NEW SECTION

WAC 51-11C-402132 Equation C402-2--Proposed UA_p .

Equation C402-2 Proposed UA_p

$$UA_p = U_{rad}A_{rad} + U_{mr}A_{mr} + U_{ra}A_{ra} + U_{mw}A_{mw} + U_{mbw}A_{mbw} + U_{sfw}A_{sfw} + U_{wfow}A_{wfow} + U_{fm}A_{fm} + U_{fj}A_{fj} + F_sP_s + F_{sr}P_{sr} + U_{ds}A_{ds} + U_{dr}A_{dr} + U_{vg}A_{vg} + U_{vgmf}A_{vgmf} + U_{vgmo}A_{vgmo} + U_{vgd}A_{vgd} + U_{og}A_{og}$$

Where:

- UA_p = The combined proposed specific heat transfer of the gross exterior wall, floor and roof/ceiling assembly area.
 U_{rad} = The thermal transmittance of the roof area where the insulation is entirely above the roof deck.
 A_{rad} = Opaque roof area where the insulation is entirely above roof deck.
 U_{mr} = The thermal transmittance of the metal building roof area.
 A_{mr} = Opaque metal building roof area.
 U_{ra} = The thermal transmittance of the roof over attic and other roof area.
 A_{ra} = Opaque roof over attic and other roof area.
 U_{mw} = The thermal transmittance of the opaque mass wall area.
 A_{mw} = Opaque mass wall area (not including opaque doors).
 U_{mbw} = The thermal transmittance of the opaque metal building wall area.
 A_{mbw} = Opaque metal building wall area (not including opaque doors).
 U_{sfw} = The thermal transmittance of the opaque steel framed wall area.
 A_{sfw} = Opaque steel framed wall area (not including opaque doors).
 U_{wfow} = The thermal transmittance of the opaque wood framed and other wall area.
 A_{wfow} = Opaque wood framed and other wall area (not including opaque doors).
 U_{fm} = The thermal transmittance of the mass floor over unconditioned space area.
 A_{fm} = Mass floor area over unconditioned space.
 U_{fj} = The thermal transmittance of the joist floor over unconditioned space area.
 A_{fj} = Joist floor area over unconditioned space.
 F_s = Slab-on-grade floor component F-factor.

P_s	=	Linear feet of slab-on-grade floor perimeter.
F_{sr}	=	Radiant floor component F-factor.
P_{sr}	=	Linear feet of radiant floor perimeter.
U_{ds}	=	The thermal transmittance value of the opaque swinging door area.
A_{ds}	=	Opaque swinging door area.
U_{dr}	=	The thermal transmittance value of the opaque roll-up or sliding door area.
A_{dr}	=	Opaque roll-up or sliding door area.
U_{vg}	=	The thermal transmittance of the vertical fenestration area with nonmetal framing.
A_{vg}	=	Vertical fenestration area with nonmetal framing.
U_{vgmf}	=	The thermal transmittance of the vertical fenestration area with fixed metal framing.
A_{vgmf}	=	Vertical fenestration area with fixed metal framing.
U_{vgmo}	=	The thermal transmittance of the vertical fenestration area with operable metal framing.
A_{vgmo}	=	Vertical fenestration area with operable metal framing.
U_{vgd}	=	The thermal transmittance of the vertical fenestration area for entrance doors.
A_{vgd}	=	Vertical fenestration area for entrance doors.
U_{og}	=	The thermal transmittance for the skylights.
A_{og}	=	Skylight area.

NOTE: Where more than one type of wall, window, roof/ceiling, door and skylight is used, the U and A terms for those items shall be expanded into subelements as:

$$U_{mw1}A_{mw1} + U_{mw2}A_{mw2} + U_{sfw1}A_{sfw1} + \dots \text{etc.}$$

NEW SECTION

WAC 51-11C-402133 Equation C402-3--Target SHGCA_t.

Equation C402-3 Target SHGCA_t

$$SHGCA_t = SHGC_t (A_{ogort} + A_{vgt} + A_{vgmt} + A_{vgmot} + A_{vgdt})$$

Where:

$SHGCA_t$ = The target combined specific heat gain of the target fenestration area.

$SHGC_t$ = The solar heat gain coefficient for fenestration found in Table C402.3 which corresponds to the proposed total fenestration area as a percent of gross exterior wall area, and A_{ogort} , A_{vgt} , A_{vgmt} , A_{vgmot} and A_{vgdt} are defined under Equation C402-1.

NEW SECTION

WAC 51-11C-402134 Equation C402-4--Proposed SHGCA_p.

**Equation C402-4
Proposed SHGCA_p**

$$\text{SHGCA}_p = \text{SHGC}_{og}A_{og} + \text{SHGC}_{vg}A_{vg}$$

Where:

SHGCA_t = The combined proposed specific heat gain of the proposed fenestration area.

SHGC_{og} = The solar heat gain coefficient of the skylights.

A_{og} = The skylight area.

SHGC_{vg} = The solar heat gain coefficient of the vertical fenestration.

A_{vg} = The vertical fenestration area.

NEW SECTION

WAC 51-11C-40214 Section C402.1.4--Semi-heated spaces.

C402.1.4 Semi-heated spaces. All spaces shall comply with the requirements in Section C402 unless they meet the definition for semi-heated spaces. For semi-heated spaces, the building envelope shall comply with the same requirements as that for conditioned spaces in Section C402; however, for semi-heated spaces heated by other than electric resistance heating equipment, wall insulation is not required for those walls that separate semi-heated spaces from the exterior provided that the space meets all the requirements of semi-heated space. Semi-heated spaces shall be calculated separately from other conditioned spaces for compliance purposes. Building envelope assemblies separating conditioned space from semi-heated space shall comply with exterior envelope insulation requirements. When choosing the uninsulated wall option, the wall shall not be included in Component Performance Building Envelope Option calculation.

NEW SECTION

WAC 51-11C-40220 Section C402.2--Specific insulation requirements.

C402.2 Specific insulation requirements (Prescriptive). Opaque assemblies shall comply with Table C402.2. Where two or more layers of continuous insulation board are used in a construction assembly, the continuous insulation boards shall be installed in accordance with Section C303.2. If the continuous insulation board manufacturer's installation instructions do not address installation of two or more layers, the edge joints between each layer of continuous insulation boards shall be staggered.

NEW SECTION

WAC 51-11C-402200 Table C402.2--Opaque thermal envelope requirements.

**Option 1 for Section 51-11C-402200:
Table C402.2
Opaque Thermal Envelope Requirements^{a, f}**

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	R-30ci	R-38ci	R-30ci	R-38ci
Metal buildings (with R-5 thermal blocks) ^{a, b}	R-25 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS
Attic and other	R-49	R-49	R-49	R-49
Walls, Above Grade				
Mass	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci
Metal building	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-19 + R-16ci
Steel framed	R-13 + R-10ci	R-19 + R-8.5ci	R-13 + R-12.5ci	R-19 + R-14ci
Wood framed and other	R-21 int	R-21 int	R-13 + R-7.5ci or R-20 + R-3.8ci	R-21 + R-5ci
Walls, Below Grade				
Below-grade wall ^d	Same as above grade	Same as above grade	Same as above grade	Same as above grade
Floors				
Mass	R-30ci	R-30ci	R-30ci	R-30ci
Joist/framing	R-30 ^e	R-30 ^e	R-38 ^e	R-38 ^e
Slab-on-Grade Floors				

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Unheated slabs	R-15 for 24" below	R-20 for 24" below	R-20 for 48" below	R-25 for 48" below
Heated slabs ^d	R-10 perimeter & under entire slab	R-10 perimeter & under entire slab	R-10 perimeter & under entire slab	R-10 perimeter & under entire slab
Opaque Doors				
Swinging	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or sliding	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System--A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

^a Assembly descriptions can be found in Chapter 2 and Appendix A.

^b Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.2.

^c R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-ft² °F.

^d Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

^e Steel floor joist systems shall be insulated to R-38 + R-10ci.

^f For roof, wall or floor assemblies where the proposed assembly would not be continuous insulation, two alternate nominal R-value compliance options for assemblies with isolated metal penetrations of otherwise continuous insulation are:

Assemblies with true continuous insulation (criteria in table)	Alternate option for assemblies with metal penetrations, but less than 0.0004 (less than 0.04%)	Alternate option for assemblies with metal penetrations, but less than 0.0008 (less than 0.08%)
R-11.4ci	R-14.3 w/ < 0.0004 metal penetrations	R-17.1 w/ < 0.0008 metal penetrations
R-13.3ci	R-16.6 w/ < 0.0004 metal penetrations	R-20.0 w/ < 0.0008 metal penetrations
R-15.2ci	R-19.0 w/ < 0.0004 metal penetrations	R-22.8 w/ < 0.0008 metal penetrations
R-30ci	R-38 w/ < 0.0004 metal penetrations	R-45 w/ < 0.0008 metal penetrations
R-38ci	R-48 w/ < 0.0004 metal penetrations	R-57 w/ < 0.0008 metal penetrations
R-13 + R7.5ci	R-13 + R9.4 w/ < 0.0004 metal penetrations	R-13 + R11.3 w/ < 0.0008 metal penetrations
R-13 + R10ci	R-13 + R12.5 w/ < 0.0004 metal penetrations	R-13 + R15 w/ < 0.0008 metal penetrations
R-13 + R12.5ci	R-13 + R15.6 w/ < 0.0004 metal penetrations	R-13 + R18.8 w/ < 0.0008 metal penetrations
R-13 + R13ci	R-13 + R16.3 w/ < 0.0004 metal penetrations	R-13 + 20 w/ < 0.0008 metal penetrations
R-19 + R8.5ci	R-19 + R10.6 w/ < 0.0004 metal penetrations	R-19 + R12.8 w/ < 0.0008 metal penetrations
R-19 + R14ci	R-19 + R17.5 w/ < 0.0004 metal penetrations	R-19 + R21 w/ < 0.0008 metal penetrations
R-19 + R16ci	R-19 + R20 w/ < 0.0004 metal penetrations	R-19 + R24 w/ < 0.0008 metal penetrations
R-20 + R3.8ci	R-20 + R4.8 w/ < 0.0004 metal penetrations	R-20 + R5.7 w/ < 0.0008 metal penetrations
R-21 + R5ci	R-21 + R6.3 w/ < 0.0004 metal penetrations	R-21 + R7.5 w/ < 0.0008 metal penetrations

These alternate nominal R-value compliance options are allowed for projects complying with all of the following:

1. The ratio of the cross-sectional area, as measured in the plane of the surface, of metal penetrations of otherwise continuous insulation to the opaque surface area of the assembly is:
 - i. Less than 0.0004 (less than 0.04%).
 - ii. Equal to or greater than 0.0004 (less than 0.04%), but less than 0.0008 (less than 0.08%).
2. The metal penetrations of otherwise continuous insulation are isolated or discontinuous (e.g., brick ties or other discontinuous metal attachments, offset brackets supporting shelf angles that allow insulation to go between the shelf angle and the primary portions of the wall structure). No continuous metal elements (e.g., metal studs, z-girts, z-channels, shelf angles) penetrate the otherwise continuous portion of the insulation.
3. Building permit drawings shall contain details showing the locations and dimensions of all the metal penetrations (e.g., brick ties or other discontinuous metal attachments, offset brackets, etc.) of otherwise continuous insulation. In addition, calculations shall be provided showing the ratio of the cross-sectional area of metal penetrations of otherwise continuous insulation to the overall opaque wall area.

For other cases where the proposed assembly is not continuous insulation, see Section C402.1.2 for determination of *U*-factors for assemblies that include metal other than screws and nails.

Option 2 for Section 51-11C-402200:

Table C402.2

Opaque Thermal Envelope Requirements^{a, f}

CLIMATE ZONE	5 AND MARINE 4		6	
	All Other	Group R	All Other	Group R
Roofs				
Insulation entirely above deck	R-30ci	R-38ci	R-30ci	R-38ci
Metal buildings (with R-5 thermal blocks) ^{a, b}	25 + R-11 LS	25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS
Attic and other	R-49	R-49	R-49	R-49
Walls, Above Grade				
Mass	R-9.5ci	R-13.3ci	R-11.4ci	R-15.2ci
Metal building	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-19 + R-16ci
Steel framed	R-13 + R-10ci	R-19 + R-8.5ci	R-13 + R-12.5ci	R-19 + R-14ci
Wood framed and other	R-21 int	R-21 int	R-13 + R-7.5ci or R-20 + R-3.8ci	R-21 + R-5ci
Walls, Below Grade				
Below-grade wall ^d	Same as above grade	Same as above grade	Same as above grade	Same as above grade
Floors				
Mass	R-30ci	R-30ci	R-30ci	R-30ci
Joist/framing	R-30 ^e	R-30 ^e	R-38 ^e	R-38 ^e
Slab-on-Grade Floors				
Unheated slabs	R-15 for 24" below	R-20 for 24" below	R-20 for 48" below	R-25 for 48" below
Heated slabs ^d	R-10 perimeter & under entire slab	R-10 perimeter & under entire slab	R-10 perimeter & under entire slab	R-10 perimeter & under entire slab
Opaque Doors				
Swinging	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or sliding	R-4.75	R-4.75	R-4.75	R-4.75

- For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.
- LS = Liner system--A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.
- ^g Assembly descriptions can be found in Chapter 2 and Appendix A.
- ^h Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.2.
- ⁱ R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-ft² °F.
- ^j Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
- ^k Steel floor joist systems shall be insulated to R-38 + R-10ci.
- ^l For roof, wall or floor assemblies where the proposed assembly would not be continuous insulation, two alternate nominal R-value compliance options for assemblies with isolated metal penetrations of otherwise continuous insulation are:

Assemblies with true continuous insulation (criteria in table)	Alternate option for assemblies with metal penetrations, but less than 0.0004 (less than 0.04%)	Alternate option for assemblies with metal penetrations, but less than 0.0008 (less than 0.08%)
R-11.4ci	R-14.3 w/ < 0.0004 metal penetrations	R-17.1 w/ < 0.0008 metal penetrations
R-13.3ci	R-16.6 w/ < 0.0004 metal penetrations	R-20.0 w/ < 0.0008 metal penetrations
R-15.2ci	R-19.0 w/ < 0.0004 metal penetrations	R-22.8 w/ < 0.0008 metal penetrations
R-30ci	R-38 w/ < 0.0004 metal penetrations	R-45 w/ < 0.0008 metal penetrations
R-38ci	R-48 w/ < 0.0004 metal penetrations	R-57 w/ < 0.0008 metal penetrations
R-13 + R7.5ci	R-13 + R9.4 w/ < 0.0004 metal penetrations	R-13 + R11.3 w/ < 0.0008 metal penetrations
R-13 + R10ci	R-13 + R12.5 w/ < 0.0004 metal penetrations	R-13 + R15 w/ < 0.0008 metal penetrations
R-13 + R12.5ci	R-13 + R15.6 w/ < 0.0004 metal penetrations	R-13 + R18.8 w/ < 0.0008 metal penetrations
R-13 + R13ci	R-13 + R16.3 w/ < 0.0004 metal penetrations	R-13 + 20 w/ < 0.0008 metal penetrations
R-19 + R8.5ci	R-19 + R10.6 w/ < 0.0004 metal penetrations	R-19 + R12.8 w/ < 0.0008 metal penetrations
R-19 + R14ci	R-19 + R17.5 w/ < 0.0004 metal penetrations	R-19 + R21 w/ < 0.0008 metal penetrations
R-19 + R16ci	R-19 + R20 w/ < 0.0004 metal penetrations	R-19 + R24 w/ < 0.0008 metal penetrations
R-20 + R3.8ci	R-20 + R4.8 w/ < 0.0004 metal penetrations	R-20 + R5.7 w/ < 0.0008 metal penetrations
R-21 + R5ci	R-21 + R6.3 w/ < 0.0004 metal penetrations	R-21 + R7.5 w/ < 0.0008 metal penetrations

These alternate nominal R-value compliance options are allowed for projects complying with all of the following:

1. The ratio of the cross-sectional area, as measured in the plane of the surface, of metal penetrations of otherwise continuous insulation to the opaque surface area of the assembly is:
 - i. Less than 0.0004 (less than 0.04%).
 - ii. Equal to or greater than 0.0004 (less than 0.04%), but less than 0.0008 (less than 0.08%).
2. The metal penetrations of otherwise continuous insulation are isolated or discontinuous (e.g., brick ties or other discontinuous metal attachments, offset brackets supporting shelf angles that allow insulation to go between the shelf angle and the primary portions of the wall structure). No continuous metal elements (e.g., metal studs, z-girts, z-channels, shelf angles) penetrate the otherwise continuous portion of the insulation.
3. Building permit drawings shall contain details showing the locations and dimensions of all the metal penetrations (e.g., brick ties or other discontinuous metal attachments, offset brackets, etc.) of otherwise continuous insulation. In addition, calculations shall be provided showing the ratio of the cross-sectional area of metal penetrations of otherwise continuous insulation to the overall opaque wall area.

For other cases where the proposed assembly is not continuous insulation, see Section C402.1.2 for determination of U-factors for

assemblies that include metal other than screws and nails.

NEW SECTION

WAC 51-11C-40221 Section C402.2.1--Roof assembly.

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or *R*-5, whichever is less.

EXCEPTIONS:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.
2. Unit skylight curbs included as a component of an NFRC 100 rated assembly shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

C402.2.1.1 Roof solar reflectance and thermal emittance. Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled *conditioned spaces* in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table C402.2.1.1.

EXCEPTIONS:

The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:

1. Portions of roofs that include or are covered by:
 - 1.1. Photovoltaic systems or components.
 - 1.2. Solar air or water heating systems or components.
 - 1.3. Roof gardens or landscaped roofs.
 - 1.4. Above-roof decks or walkways.
 - 1.5. Skylights.
 - 1.6. HVAC systems, components, and other opaque objects mounted above the roof.
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74 kg/m²) or 23 psf (117 kg/m²) pavers.
4. Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.

NEW SECTION

WAC 51-11C-40221 Table C402.2.1.1--Reflectance and emittance options.

Table C402.2.1.1 Reflectance and Emittance Options*

Three-year aged solar reflectance ^b of 0.55 and three-year aged thermal emittance ^c of 0.75
Initial solar reflectance ^b of 0.70 and initial thermal emittance ^c of 0.75
Three-year-aged solar reflectance index ^d of 64 initial solar reflectance index ^d of 82

^a The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either solar reflectance or thermal emittance, shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90. Materials lacking three-year aged tested values for either solar reflectance or thermal emittance shall be assigned both a three-year aged solar reflectance of 0.10 and a three-year aged thermal emittance of 0.90.

^b Solar reflectance tested in accordance with ASTM C 1549, ASTM E 903 or ASTM E 1918.

^c Thermal emittance tested in accordance with ASTM C 1371 or ASTM E 408.

^d Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h x ft² x °F (12W/m² x K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.

NEW SECTION

WAC 51-11C-40222 Section C402.2.2--Classification of walls.

C402.2.2 Classification of walls. Walls associated with the building envelope shall be classified in accordance with Section C202.

NEW SECTION

WAC 51-11C-40223 Section C402.2.3--Above-grade walls.

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m²) of wall surface area; or
2. 25 psf (120 kg/m²) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1,900 kg/m³).

NEW SECTION

WAC 51-11C-40224 Section C402.2.4--Below-grade walls.

C402.2.4 Thermal resistance of below-grade walls. The minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table C402.2.

NEW SECTION

WAC 51-11C-40225 Section C402.2.5--Floors over unconditioned space.

C402.2.5 Floors over outdoor air or unconditioned space. The minimum thermal resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly.

"Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m²) of floor surface area; or
2. 25 psf (120 kg/m²) of floor surface area if the material weight is not more than 12 pcf (1,900 kg/m³).

NEW SECTION

WAC 51-11C-40226 Section C402.2.6--Slab on grade.

C402.2.6 Slabs on grade. Where the slab on grade is in contact with the ground, the minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors shall be as specified in Table C402.2. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.

EXCEPTION: Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

NEW SECTION

WAC 51-11C-40227 Section C402.2.7--Opaque doors.

C402.2.7 Opaque doors. Opaque doors (doors having less than 50 percent glass area) shall meet the applicable requirements for doors as specified in Table C402.2 and be considered as part of the gross area of above-grade walls that are part of the building envelope.

NEW SECTION

WAC 51-11C-40228 Section C402.2.8--Insulation of radiant heating systems.

C402.2.8 Insulation of radiant heating systems. Radiant panels, and associated U-bends and headers, designed for sensible heating of an indoor space through heat transfer from the thermally effective panel surfaces to the occupants or indoor space by thermal radiation and natural convection and the bottom surfaces of floor structures incorporating radiant heating shall be insulated with a minimum of R-3.5 ($0.62 \text{ m}^2/\text{K} \times \text{W}$).

NEW SECTION

WAC 51-11C-40230 Section C402.3--Fenestration (Prescriptive).

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

NEW SECTION

WAC 51-11C-402300 Table C402.3--Building envelope requirements--Fenestration.

**Table C402.3
Building Envelope Requirements--Fenestration**

CLIMATE ZONE	5 AND MARINE 4	6
Vertical Fenestration		
U-factor		
Nonmetal framing (all) ^a	0.30	0.30
Metal framing (fixed) ^b	0.38	0.36
Metal framing (operable) ^c	0.40	0.40
Metal framing (entrance doors) ^d	0.60	0.60
SHGC		
SHGC	0.40	0.40
Skylights		
U-factor	0.50	0.50
SHGC	0.35	0.35

NR= No requirement.

^a "Nonmetal framing" includes framing materials other than metal, with or without metal reinforcing or cladding.

^b "Metal framing" includes metal framing, with or without thermal break. "Fixed" includes curtain wall, storefront, picture windows, and other fixed windows.

^c "Metal framing" includes metal framing, with or without thermal break. "Operable" includes operable fenestration products other than "entrance doors."

^d "Metal framing" includes metal framing, with or without thermal break. "Entrance door" includes glazed swinging entrance doors. Other doors which are not entrance doors, including sliding glass doors, are considered "operable."

NEW SECTION

WAC 51-11C-40231 Section C402.3.1--Maximum area.

C402.3.1 Maximum area. The vertical fenestration area (not including opaque doors and opaque spandrel panels) shall not exceed 30 percent of the gross above-grade wall area. The skylight area shall not exceed 3 percent of the gross roof area.

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. Automatic daylighting controls are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

EXCEPTION: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

C402.3.1.2 Increased skylight area with daylighting controls. The

skylight area shall be permitted to be a maximum of 5 percent of the roof area provided automatic daylighting controls are installed in daylight zones under skylights.

NEW SECTION

WAC 51-11C-40232 Section C402.3.2--Minimum skylight fenestration area.

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than 10,000 square feet (929 m²), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent with a skylight VT of at least 0.40; or

2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation C4-1.

(Equation C4-1)

where:

Skylight area = Total fenestration area of skylights.

Skylight VT = Area weighted average visible transmittance of skylights.

WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.

Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

EXCEPTION:

Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in Climate Zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

C402.3.2.1 Lighting controls in daylight zones under skylights.

All lighting in the daylight zone shall be controlled by automatic daylighting controls that comply with Section C405.2.2.3.2.

EXCEPTION:

Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in Climate Zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

C402.3.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, nonrefrigerated warehouse, retail store, and distribution/sorting area spaces shall have a glazing material or diffuser with a measured haze factor greater than 90 percent when tested in accordance with ASTM D 1003.

EXCEPTION: Skylights designed to exclude direct sunlight entering the occupied space by the use of fixed or automated baffles, or the geometry of skylight and light well need not comply with Section C402.3.2.2.

NEW SECTION

WAC 51-11C-40233 Section C402.3.3--Maximum U-factor and SHGC.

C402.3.3 Maximum U-factor and SHGC. For vertical fenestration, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3, based on the window projection factor. For skylights, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3.

The window projection factor shall be determined in accordance with Equation C4-2.

$$PF = A/B$$

(Equation C4-2)

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately.

C402.3.3.1 SHGC adjustment. Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the required maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the multiplier specified in Table C402.3.3.1 corresponding with the orientation of the fenestration product and the projection factor.

**Table C402.3.3.1
SHGC Adjustment Multipliers**

PROJECTION FACTOR	ORIENTED WITHIN 45 DEGREES OF TRUE NORTH	ALL OTHER ORIENTATION
$0.2 \leq PF < 0.5$	1.1	1.2
$PF \geq 0.5$	1.2	1.6

C402.3.3.2 Increased vertical fenestration SHGC. In Climate Zones 1, 2 and 3, vertical fenestration entirely located not less than 6 feet (1729 mm) above the finished floor shall be permitted a maximum SHGC of 0.40.

C402.3.3.3 Reserved.

C402.3.3.4 Reserved.

C402.3.3.5 Dynamic glazing. For compliance with Section C402.3.3, the SHGC for dynamic glazing shall be determined using the manufacturer's lowest-rated SHGC, and the VT/SHGC ratio shall be determined using the maximum VT and maximum SHGC. Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

NEW SECTION

WAC 51-11C-40234 Section C402.3.4--Area-weighted *U*-factor.

C402.3.4 Area-weighted *U*-factor. An area-weighted average shall be permitted to satisfy the *U*-factor requirements for each fenestration product category listed in Table C402.3. Individual fenestration products from different fenestration product categories listed in Table C402.3 shall not be combined in calculating area-weighted average *U*-factor.

NEW SECTION

WAC 51-11C-40240 Section C402.4--Air leakage.

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8.

NEW SECTION

WAC 51-11C-40241 Section C402.4.1--Air barriers.

C402.4.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.4.1.1 and C402.4.1.2.

EXCEPTION: Air barriers are not required in buildings located in Climate Zones 1, 2 and 3.

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.

2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

3. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

EXCEPTION: Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 3.

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque building envelope shall comply with Section C402.4.1.2.1, C402.4.1.2.2, or C402.4.1.2.3.

C402.4.1.2.1 Materials. Materials with an air permeability no greater than 0.004 cfm/ft² (0.02 L/s • m²) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. Materials in Items 1 through 15 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.

1. Plywood with a thickness of not less than 3/8 inch (10 mm).
2. Oriented strand board having a thickness of not less than

3/8 inch (10 mm).

3. Extruded polystyrene insulation board having a thickness of not less than 1/2 inch (12 mm).

4. Foil-back polyisocyanurate insulation board having a thickness of not less than 1/2 inch (12 mm).

5. Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m³) having a thickness of not less than 1 1/2 inches (36 mm).

6. Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m³) and having a thickness of not less than 4.5 inches (113 mm).

7. Exterior or interior gypsum board having a thickness of not less than 1/2 inch (12 mm).

8. Cement board having a thickness of not less than 1/2 inch (12 mm).

9. Built up roofing membrane.

10. Modified bituminous roof membrane.

11. Fully adhered single-ply roof membrane.

12. A Portland cement/sand parge, or gypsum plaster having a thickness of not less than 5/8 inch (16 mm).

13. Cast-in-place and precast concrete.

14. Fully grouted concrete block masonry.

15. Sheet steel or aluminum.

C402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft² (0.2 L/s • m²) under a pressure differential of 0.3 inches of water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.

1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;

2. A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.

C402.4.1.2.3 Building test. The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge (2.0 L/s • m² at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official.

NEW SECTION

WAC 51-11C-40242 Section C402.4.2--Air barrier penetrations.

C402.4.2 Air barrier penetrations. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or

taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

NEW SECTION

WAC 51-11C-40243 Section C402.4.3--Air leakage of fenestration.

C402.4.3 Air leakage of fenestration. The air leakage of fenestration assemblies shall meet the provisions of Table C402.4.3. Testing shall be in accordance with the applicable reference test standard in Table C402.4.3 by an accredited, independent testing laboratory and *labeled* by the manufacturer.

EXCEPTIONS:

1. Field-fabricated fenestration assemblies that are sealed in accordance with Section C402.4.1.
2. Fenestration in buildings that comply with Section C402.4.1.2.3 are not required to meet the air leakage requirements in Table C402.4.3.
3. Custom exterior windows and doors manufactured by a small business provided they meet the applicable provisions of Chapter 24 of the *International Building Code*. Once visual inspection has confirmed the presence of a gasket, operable windows and doors manufactured by *small business* shall be permitted to be sealed off at the frame prior to the test.

**Table C402.4.3
Maximum Air Infiltration Rate
for Fenestration Assemblies**

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT ²)	TEST PROCEDURE
Windows	0.20 ^a	AAMA/ WDMA/ CSA101/I.S.2 /A440 or NFRC 400
Sliding doors	0.20 ^a	
Swinging doors	0.20 ^a	
Skylights - With condensation weepage openings	0.30	
Skylights - All other	0.20 ^a	
Curtain walls	0.06	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	1.00	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E 283 at 1.57 psf (75 Pa)
Rolling doors	1.00	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m².

^a The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of

NEW SECTION

WAC 51-11C-40244 Section C402.4.4--Doors and access openings.

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies shall either meet the requirements of Section C402.4.3 or shall be gasketed, weatherstripped or sealed.

EXCEPTION: Door openings required to comply with Section 715 or 715.4 of the *International Building Code*; or doors and door openings required by the *International Building Code* to comply with UL 1784 shall not be required to comply with Section C402.4.4.

NEW SECTION

WAC 51-11C-40245 Section C402.4.5--Air intakes, exhaust openings, stairways and shafts.

C402.4.5 Air intakes, exhaust openings, stairways and shafts. Stairway enclosures and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be provided with dampers in accordance with Sections C402.4.5.1 and C402.4.5.2.

C402.4.5.1 Stairway and shaft vents. Stairway and shaft vents shall be provided with Class I motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Stairway and shaft vent dampers shall be installed with controls so that they are capable of automatically opening upon:

1. The activation of any fire alarm initiating device of the building's fire alarm system; or
2. The interruption of power to the damper.

C402.4.5.2 Outdoor air intakes and exhausts. Outdoor air supply, exhaust openings and relief outlets shall be provided with Class IA motorized dampers which close automatically when the system is off. Return air dampers shall be equipped with motorized dampers. Dampers shall have a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

EXCEPTIONS:

1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft² (101.6 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used for relief openings in buildings less than three stories in height above grade if equipment has less than 5,000 cfm total supply flow.
2. Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.
3. Gravity dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft² (203.2 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.
4. Gravity (nonmotorized) dampers in Group R occupancies where the design outdoor air intake or exhaust capacity does not exceed 400 cfm (189 L/s).

NEW SECTION

WAC 51-11C-40246 Section C402.4.6--Loading dock weatherseals.

C402.4.6 Loading dock weatherseals. Cargo doors and loading dock doors shall be equipped with weatherseals to restrict infiltration when vehicles are parked in the doorway.

NEW SECTION

WAC 51-11C-40247 Section C402.4.7--Vestibules.

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Interior and exterior doors shall have a minimum distance between them of not less than 7 feet. The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior envelope of unconditioned vestibules shall comply with the requirements for a conditioned space. The building lobby is not considered a vestibule.

EXCEPTIONS:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m²) in area and are separate from the building entrance.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
7. Building entrances in buildings that are less than four stories above grade and less than 10,000 ft² in area.
8. Elevator doors in parking garages provided that the elevators have an enclosed lobby at each level of the garage.

NEW SECTION

WAC 51-11C-40248 Section C402.4.8--Recessed lighting.

C402.4.8 Recessed lighting. Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as having an air leakage rate or not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and interior wall or ceiling covering.

NEW SECTION

WAC 51-11C-40250 Section C402.5--Walk-in coolers and walk-in freezers.

C402.5 Walk-in coolers and walk-in freezers. Walk-in coolers and walk-in freezers shall comply with all of the following:

1. Shall be equipped with automatic door closers that firmly close walk-in doors that have been closed to within 1 inch of full closure.

EXCEPTION: Doors wider than 3 feet 9 inches or taller than 7 feet.

2. Doorways shall have strip doors (curtains), spring-hinged doors, or other method of minimizing infiltration when doors are open.

3. *Walk-in coolers* shall contain wall, ceiling, and door insulation of at least R-25 and *walk-in freezers* at least R-32.

EXCEPTION: Glazed portions of doors or structural members.

4. *Walk-in freezers* shall contain floor insulation of at least R-28.

5. Transparent reach-in doors for *walk-in freezers* and windows in *walk-in freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

6. Transparent reach-in doors for *walk-in coolers* and windows in *walk-in cooler* doors shall be double-pane glass with heat-reflective treated glass and gas filled; or triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

NEW SECTION

WAC 51-11C-40260 Section C402.6--Refrigerated warehouse coolers and freezers.

C402.6 Refrigerated warehouse coolers and refrigerated warehouse freezers. Refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with all of the following:

1. Shall be equipped with automatic door closers that firmly close walk-in doors that have been closed to within 1 inch of full closure.

EXCEPTION: Doors wider than 3 feet 9 inches or taller than 7 feet.

2. Doorways shall have strip doors (curtains), spring-hinged doors, or other method of minimizing infiltration when doors are open.

3. *Refrigerated warehouse coolers* shall contain wall, ceiling, and door insulation of at least R-25 and *refrigerated warehouse freezers* at least R-32.

EXCEPTION: Glazed portions of doors or structural members.

4. *Refrigerated warehouse freezers* shall contain floor insulation of at least R-28.

5. Transparent reach-in doors for *refrigerated warehouse freezers* and windows in *refrigerated warehouse freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

6. Transparent reach-in doors for *refrigerated warehouse coolers* and windows in *refrigerated warehouse cooler* doors shall be double-pane glass with heat-reflective treated glass and gas filled; or triple-pane glass, either filled with inert gas or with heat-reflective treated glass.